The Danish Test Facilities – Megavind Offspring

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DTU Wind Energy

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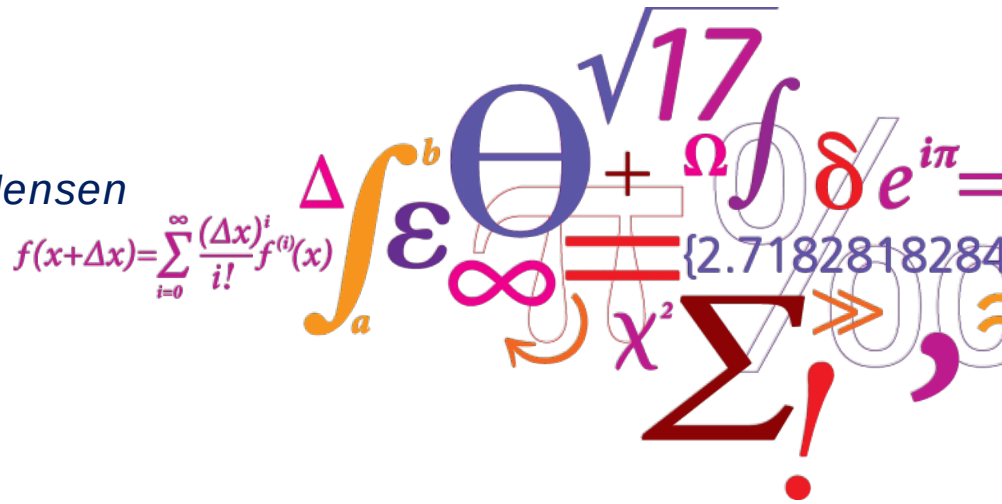
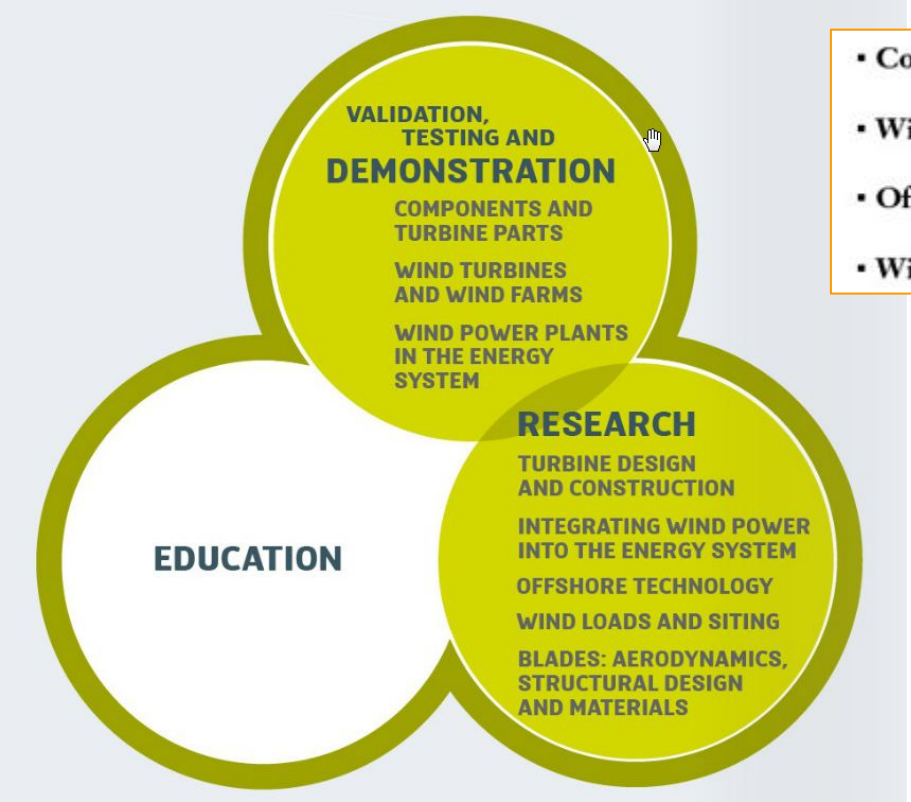


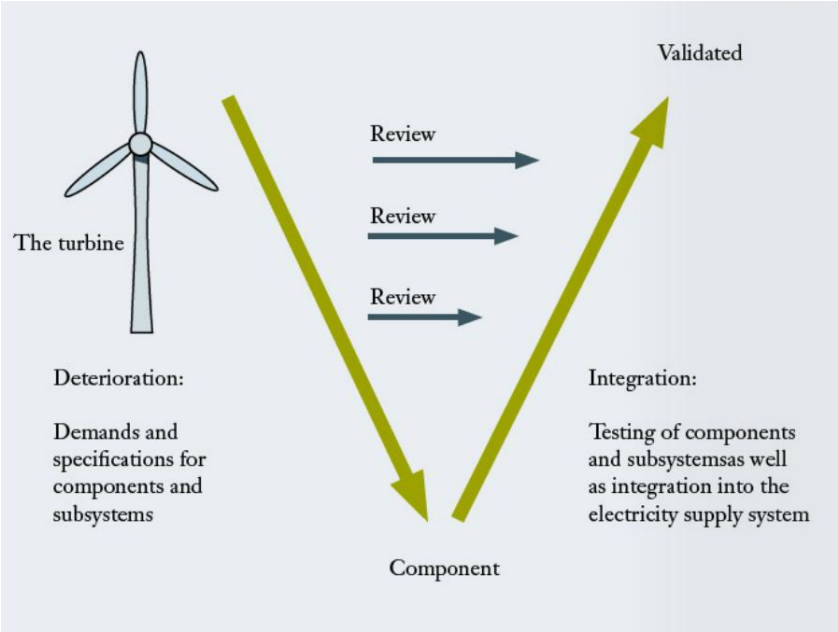
DTU Wind Energy
Department of Wind Energy

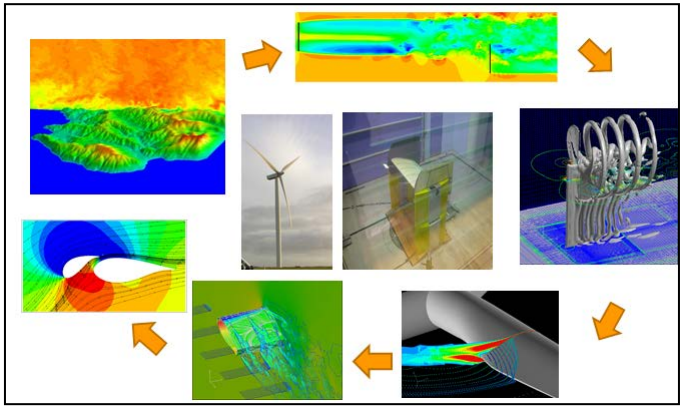
Megavind 2007 - 2013

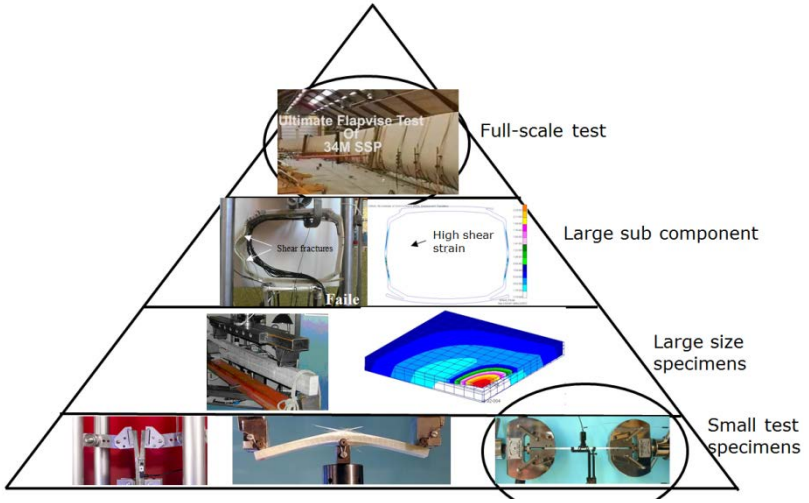


- Components and turbine parts
- Wind turbines (prototypes and pre-series) and wind power plants
- Offshore installations (e.g. foundations and grid)
- Wind power plants in the energy system

Validation – Products and research







Survey of test and research infrastructures

- **Existing and pipeline**
  - Testcenter Østerild and Test Center for Large Wind Turbines at Høvsøre, DTU Wind Energy
  - Blaest blade test facility and DTU Wind Energy static blade test facility
  - LORC test facilities and DTU Wind Energy Drivetrain Test Facility
  - Wind tunnel, DTU Wind Energy
  - Grid test facility on Testcenter Østerild, DTU Wind Energy
  - Computer Clusters, DTU Wind Energy
  - Material and component tests (Hydraulic test bench – microscopes), DTU
- **Need for new research infrastructures, DTU**
  - Research wind turbine Fatigue research blade test facility
  - Research (acoustic) wind tunnel instrumentation
  - Offshore wind conditions test equipment
  - FiberLab (scale models, prototype components)
- **Need for new industry infrastructures**
  - **More test sites** (Low wind, cold/warm climate, complex flows, duration)

DTU Test Stations – Prototype Testing

5 test beds
< 165 m
< 8 MW
Spacing 300 m

7 test beds
< 250 m
< 16 MW
Spacing 600 m

Wind Turbines at Østerild

Stand (no)	Turbine Company (model)	Effect (MW)	Diameter (m)	Nac / Tip height (m)
1	www.WindTurbineTest.com		Tender:	28/6-2013
2	Vestas (in 2014)			
3	Vestas (in 2013)			
4	www.WindTurbineTest.com		Tender:	28/6-2013
5	Envision (in 2014)			
6	Siemens (SWT-6,0)	6,0	154	120 / 197
7	Siemens (SWT-4,0)	4,0	120	110 / 170

Østerild Test Center

Wind turbine testing:

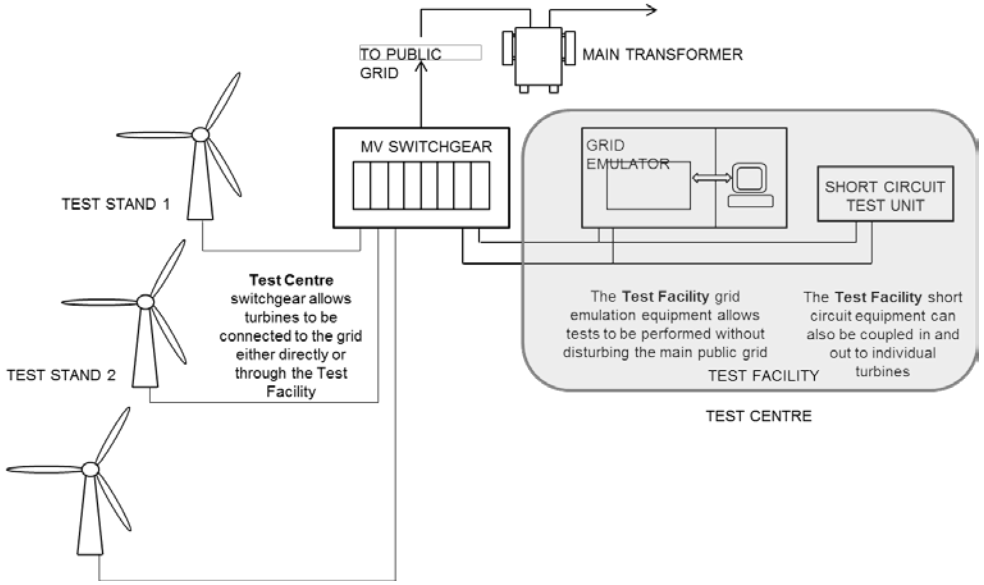
- Tests acc. to international standards (IEC)
- Development tests

Inauguration 6. Oct. 2012

Research:

- Meteorology (Wind)
- Turbine technology
- Grid integration

The DTU Wind Energy Moveable Grid Test Facility: Overall schematic



TEST STAND 3, etc…

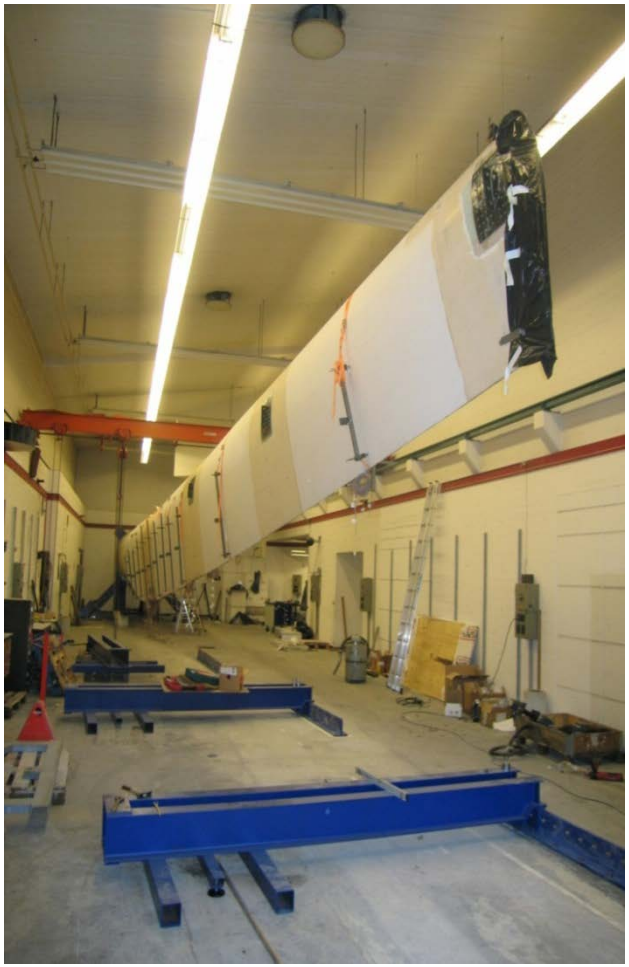
Test facility supports test of wind turbines with rated power Pn < 10MW.Two types of equipment included in the Test Facility:

1) Short circuit equipment
   - only applicable to LVRT tests,
   - required by most TSOs today

2) Power converter equipment
   - net emulation which enables tests of wind turbine response to a variety of grid conditions, including system services like primary frequency control and virtual inertia

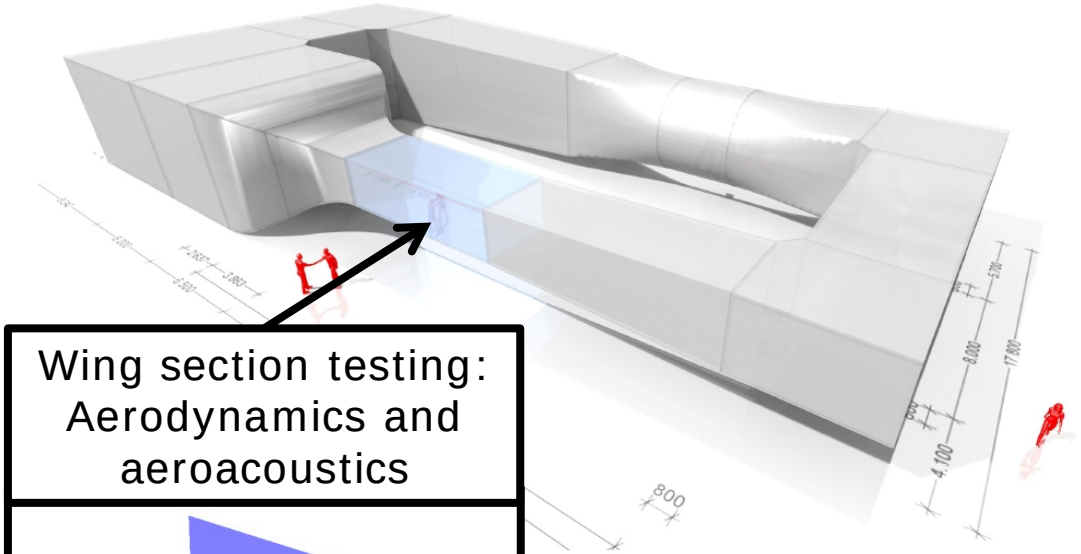
Blaest Blade test facility and DTU Wind Energy Blade Test Facilty

DTU Wind Energy

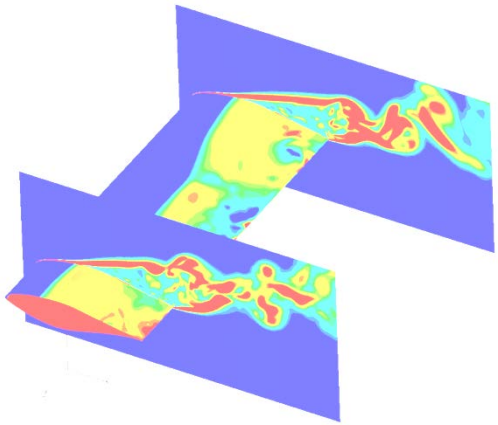


Blaest

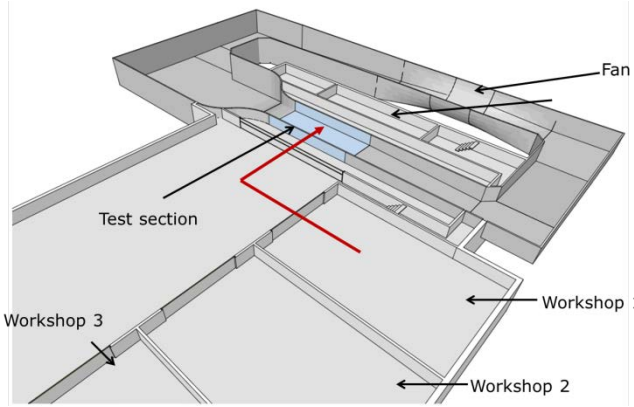
The Danish National Wind Tunnel
Dedicated for wind turbine testing



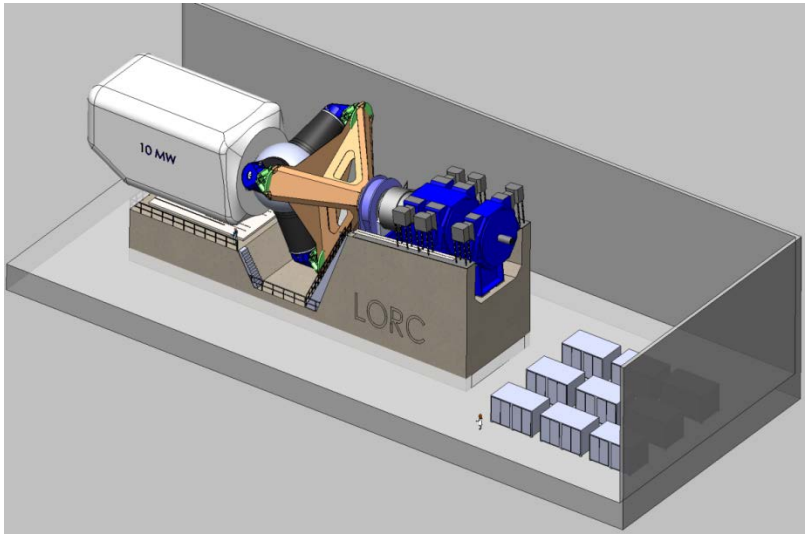
Wing section testing: Aerodynamics and aeroacoustics



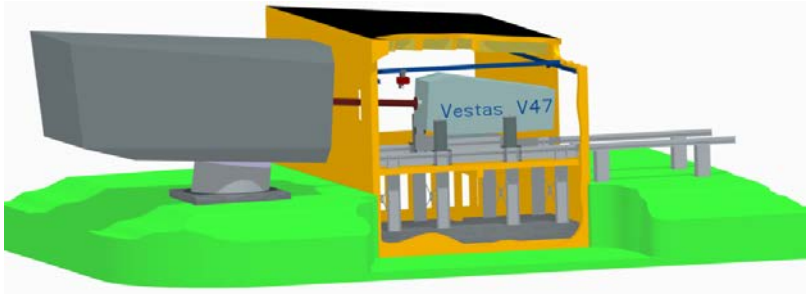
Efficient workflow



Drivetrain test facilities at LORC and DTU Wind Energy



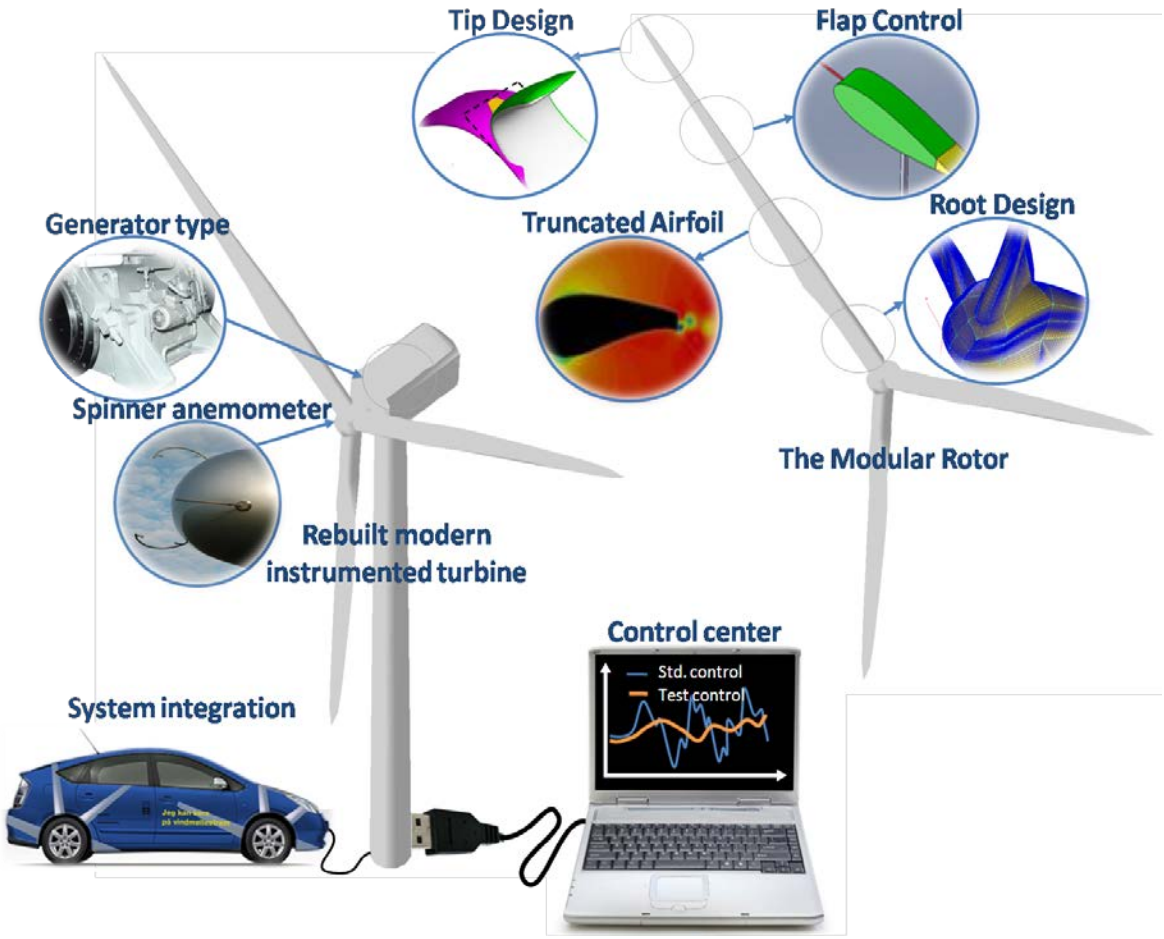
DTU Wind Energy



Need for research infrastructures at DTU Wind Energy

- Research wind turbine at DTU wind energy
- Fatigue research blade test facility
- Research instrumentation of new Wind tunnel
- Offshore wind conditions test equipment
- FiberLab

Research Wind Turbine, DTU Wind Energy




Thank you for your attention